

ASSET MANAGEMENT

WHAT MAKES SENSE FOR HYDRO?



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TACOMA POWER'S ASSET MANAGEMENT INITIATIVE

- T&D group identified 13 asset classes –
i.e. Substation transformers, station breakers, etc.
- Developed models for each class
 - Health Index, consequence cost, replacement cost, risks
- Generation now identifying asset classes, developing prioritization matrix
- Goal is to standardize the framework throughout Power, but not necessarily the tools



ASSET MANAGEMENT

- **Purpose**
- **Challenges**
- **Benefits**
- **Mossyrock Example**
- **Food For Thought**



WHAT IS THE PURPOSE OF AM?

- To *responsibly* manage the assets, *optimize* and *prioritize* maintenance/replacement decisions and to manage risk.
- Each utility is different, with different drivers and objectives – we don't all have the number of plants and the budget and reliability issues faced by the FCRPS
- *Responsibly, optimize* and *prioritize* can vary from owner to owner and plant to plant



CHALLENGES

- **There is a wide spectrum of assets that can be managed from few to many – How do you decide which assets to include in the program? How granular do you go? HydroAmp is a great start**
- **There is a cost to asset management – Administrative, gathering and analyzing data**
- **Gathering accurate data – minimizing “transactional friction”**



CHALLENGES

- **How do we return the most value to our customers?**
- **The “Joe Albertson” model has worked well for Tacoma Power Generation**
 - **Low cost in class when benchmarked amongst peers**
 - **High reliability**
- **Why change now?**



BENEFITS

- **Asset management implementation is an opportunity to establish an accurate inventory of assets**
- **Physically identify, validate and assess asset documentation and records to establish a baseline**
- **Asset management information can be used to make better decisions based on data**
- **Stabilize and better predict capital spending**
- **Provides a means to identify and quantify risks**

MOSSYROCK REBUILD DECISION USING ASSET MANAGEMENT TOOLS



Constructed in 1968
on the Cowlitz River

One of seven dams
owned and operated
by Tacoma Power

Washington State's
tallest dam –
606 feet from
bedrock (365 feet
from riverbed)



MOSSYROCK REBUILD DECISION USING ASSET MANAGEMENT TOOLS

- **The age and duty cycle of the units suggested that the generators were approaching the end of normal life**
- **Benefits of improved operating range and efficiency**
- **Many alternatives to consider**
- **Large investment – Biggest machines in the fleet**



MOSSYROCK DAM AND POWERHOUSE





MOSSYROCK UNIT 51 & 52



MOSSYROCK THIRD UNIT HOLE





EVALUATION PROCESS

- **Identify & Develop alternatives:**
 - Determine optimal characteristics of units
 - Turbine capacity, efficiencies, operating range
- **Determine optimal configuration of units**
 - Rebuild one or both, rebuild one or none and add a third unit
- **Determine Optimal Equipment and Timing**
 - Rebuild one or both with same, higher or lower capacity and/or build 3rd Unit, replace transformers and when



AM TOOLS IN PRACTICE

Tools used in planning Mossyrock rebuild:

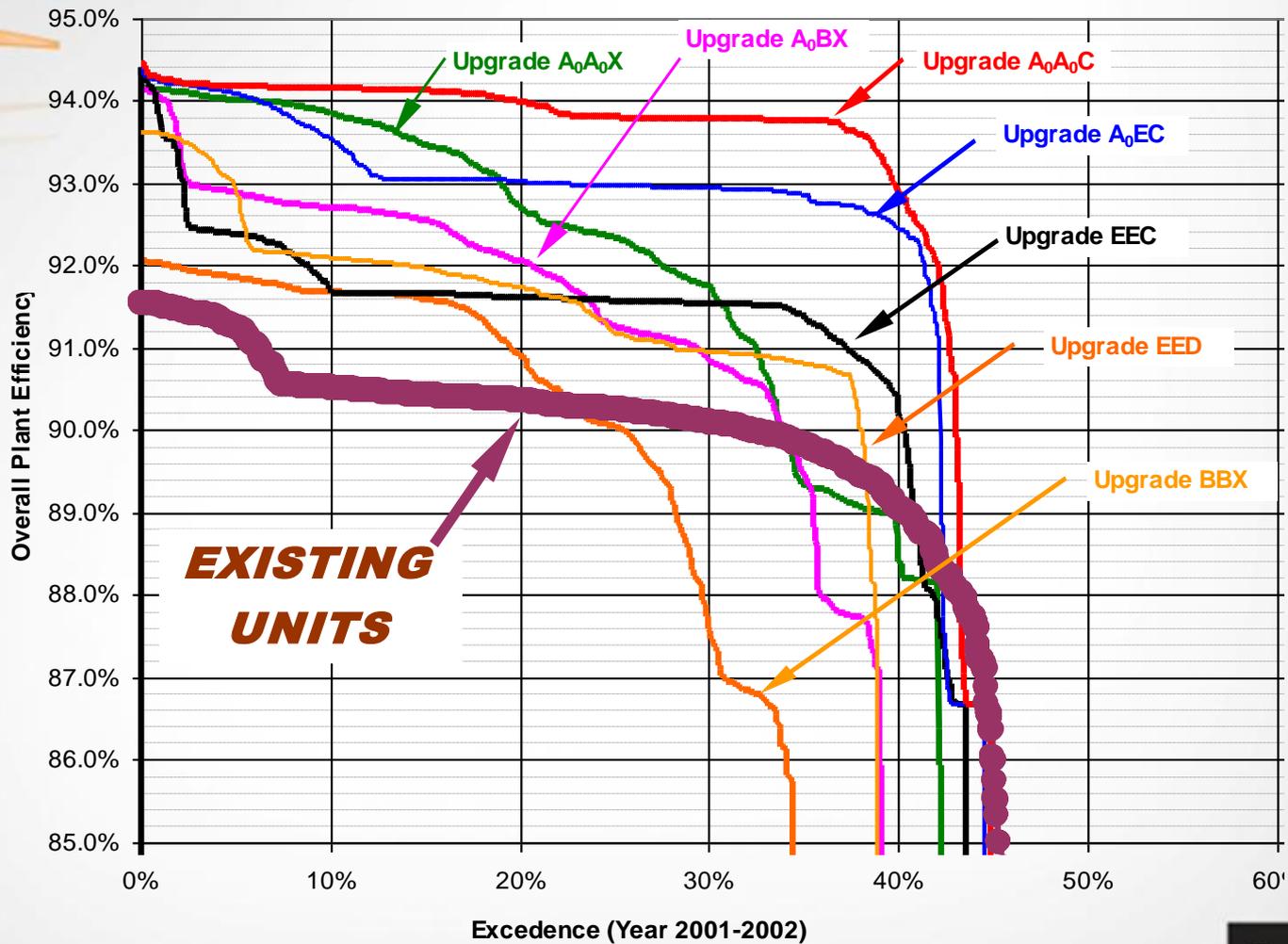
- **AUTO vista analysis**
 - Evaluate alternatives & generation benefits.
- **Hydrovantage risk analysis**
 - Evaluate failure probabilities & risk-cost benefits.
- **Models considered Mossyrock plant in combination with entire hydro fleet**



DESCRIPTION OF REBUILD OPTIONS

- **A1 – rebuild existing unit(s) with higher efficiency turbines and maintain original nameplate rating**
- **Ao – rebuild existing unit(s) and move peak efficiency point down from 150 MW to 125 MW**
- **B – rebuild existing unit(s) and move peak efficiency point up from 150 MW to 165 MW**
- **C – new 3rd unit rated at 75 MW**
- **D – new 3rd unit rated at 210 MW**

EFFICIENCY COMPARISONS





MOSSYROCK ANALYSIS - RESULTS

<i>Configuration</i>			<i>30 Year NPV</i>
<u>Unit 51</u>	<u>Unit 52</u>	<u>New Unit</u>	
A ₁	A ₀	X	7,921,000
A ₁	A ₁	X	6,608,000
A ₀	A ₀	X	5,358,000
A ₀	A ₀	C	(938,000)
A ₀	E	C	(1,516,000)
A ₁	E	C	(2,135,000)
E	E	C	(4,572,000)
A ₁	A ₀	C	(6,535,000)
A	B	X	(12,982,000)
E	E	D	(20,216,000)



BEFORE JUMPING INTO AM

- **Clearly identify your objectives**
- **Develop a policy to drive your program**
- **Strive to minimize “transactional friction”**
- **Bring value to your customers**

QUESTIONS?

